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Microscopic State of Low Doped Manganites la1-xSrx MnO3 Probed by ESR

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Abstract

The electron spin resonance (ESR) measurements were performed in single crystals of La1-xSrxMnO3 (0.05 < x < 0.125) in order to study the interplay of crystal field, Dzyaloshinsky-Moriya interaction, Jahn-Teller (JT) effect, and orbital order. The angular dependence of the ESR linewidth of an untwinned La0.95Sr0.05MnO3 single crystal has been analyzed in the high-temperature approximation, which takes into account the microscopic geometry of the four nonequivalent Mn positions in the orthorhombic unit cell. A strong mixing of the |3z2 -r2} and |x2 -y2} states for the real orbital configuration was found. Magnetic inhomogeneities observed in the ESR spectra across the composition range 0.075 < x < 0.125 can be attributed to the presence of ferromagnetic clusters (magnetic spin polarons) in the paramagnetic state. New polaronic models are proposed. ©2002 Plenum Publishing Corporation.

Keywords

ESR, Manganites, Polarons, Spin-orbit coupling